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Experiences in Teaching and Learning

Pharmacy students' perceptions toward peer assessment and its use in teaching patient presentation skills

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ABSTRACT

Background and purpose: Conducting peer assessment has been associated with positive learning outcomes in higher education. The primary objective was to evaluate pharmacy students' perceptions of using peer assessment as a pedagogical strategy in learning patient presentation skills. Secondary objectives were to determine helpful factors for providing and/or receiving peer assessment and to compare students' perceptions of peer assessment relative to receiving feedback from teaching assistants (TAs).

Educational activity and setting: Patient presentation skills were taught to third-year pharmacy students in three sessions (session 1: didactic lecture, session 2: faculty-led patient presentation workshops followed by peer assessment, session 3: one-on-one patient presentations to TAs). An anonymous survey instrument consisting of five-point Likert scale, yes/no, and open-ended questions was administered.

Findings: A total of 187 students (98%) completed the survey. Peer assessment was perceived as a useful way to obtain feedback on patient presentations (87%). It facilitated higher level thinking and a self-reflection of students' own patient presentations. Most students felt that they received constructive feedback from peers (82%) that helped them improve their patient presentation skills (72%). However, students were more trusting of TAs' skills in assessing patient presentations (76% versus 93%, $p < 0.001$). Some students were concerned about the specificity and criticalness of feedback they received from peers.

Summary: Peer assessment is a useful pedagogical strategy for providing formative feedback to students in learning patient presentations skills in the classroom setting. Students may benefit from additional training to improve the quality of feedback in peer assessment.

Background and purpose

Pharmacists are required to communicate patient information and therapeutic plans to other healthcare professionals.[1] Hence, the ability of graduates to communicate patient information is emphasized in the accreditation standards from the American Council for Pharmacy Education (ACPE) and in the statement from the International Pharmaceutical Federation (FIP).[2,3] Regulatory authorities also require students to demonstrate competency in such skills prior to registration as a pharmacist.[4]

Conducting peer assessment has been associated with positive learning outcomes in higher education.[5] The use of this pedagogical strategy offers several benefits. It encourages self-reflection, facilitates higher level thinking, promotes peer interaction, fosters responsibility, and decreases faculty workload especially for large classes.[5,6] Peer assessment had been used extensively in medical and

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pharmacy education in the classroom and experiential learning settings for various assessments such as drug monographs, clinical documentation, seminar presentations, and history-taking.[7–11]

However, there are no published experiences describing the use of this pedagogical strategy to teach patient presentation skills in the classroom setting. There is also a lack of knowledge on how pharmacy students perceive the utility of feedback via peer assessment relative to the traditional approach of providing feedback by teaching assistants (TAs). The primary objective of this study was to evaluate pharmacy students' attitudes and perceptions of using peer assessment as a pedagogical strategy in learning patient presentation skills. Secondary objectives were to determine factors that students perceive to be helpful for providing and/or receiving peer assessment and to compare students' perceptions of peer assessment relative to receiving feedback from TAs.

Educational activity and setting

The National University of Singapore (NUS) offers a four-year Bachelor of Science in Pharmacy degree that is the only recognized degree from Singapore leading to registration as a pharmacist. The program includes three years of didactic course work in anatomy, physiology, pharmaceutical sciences, pharmacology, therapeutics, pharmacy professional skills, and law, followed by a final-year consisting of research and experiential learning. The pharmacy professional skills development (PPSD) sequence at NUS consists of three required modules, each in years one to three, and allows pharmacy students to develop skills such as dispensing, counseling, and inter-professional communication. PPSD III is a required module for third-year students and is designed to prepare students for entering experiential learning in their fourth-year. This module usually conducts case-based practical sessions where students are challenged to apply pharmacy skills while integrating their therapeutics knowledge through one-on-one interactions with faculty or TAs. To ensure students' readiness for entering practice, NUS incorporated patient presentation skills into its pharmacy curriculum by first introducing such skills into PPSD III in the 2017–2018 academic year. Students practiced patient presentation skills in an authentic learning environment using mock electronic medical records with patient cases adapted from real-life and engaged in active learning through critiquing their peers' patient presentations.

Patient presentations skills were taught in three sessions over five weeks in PPSD III in the 2017–2018 academic year (see Table 1). The first session was a two-hour didactic lecture. During the first hour, students were introduced to the structure of a systematic patient presentation to be delivered within 10 minutes. Concepts were illustrated using an example patient case. The remaining class time was dedicated to group discussions to identify pertinent patient data and drug-related problems (DRPs). A grading rubric, a subjective, objective, assessment and plan (SOAP) note template and a SOAP note completed for the example patient case were provided to students. A generic grading rubric is shown in Table 2. Additionally, pre-recorded audio files of effective and ineffective patient presentations were also made available to students as examples to model a well-delivered patient presentation.

The second session consisted of pre-class learning activities, a two-hour in-class patient presentation workshop, and a post-class peer assessment. A total of two patient cases, each with four disease states and DRPs, were used for this session. Before coming to class, students first worked in groups of six students to develop a therapeutic plan for their assigned patient case. Students also

Table 1
Overview of learning activities.

Timeline	Session number	Number of times session was repeated	Number of students in attendance	Description of learning activities
Week 1	1	1	191	Didactic lecture (2 h) ■ Introduction to the structure of a systematic patient presentation illustrated using an example patient case (60 min) ■ Group discussion to identify pertinent labs and drug-related problems (60 min)
Week 3	2	4	47 to 48[a]	Pre-class learning activities ■ Group discussion of therapeutic plan ■ Individual student to audio record patient presentation In-class patient presentation workshop (2 h) ■ Group presentations of therapeutic plan (45 min) ■ Faculty-led discussion, debrief and feedback (75 min) Post-class learning activity ■ Peer assessment of a peer's audio-recorded patient presentation
Week 5	3	8	23 to 24[b]	In-class patient presentation practical (2 h) ■ Individual student to prepare patient presentation in class (45 min) ■ Individual student to present to assigned teaching assistant (TA) (10 min per student; three students per TA) ■ Debrief and feedback by TA (45 min)

[a] In-class activity was repeated 4 times to accommodate the entire class; each student only attended 1 out of the 4 workshops.
[b] In-class activity was repeated 8 times to accommodate the entire class; each student only attended 1 out of the 8 practicals.

Table 2
Generic grading rubric for assessing patient presentations.

Criterion	Indicate √, P or X[a]	Comments (required for "P" and "X")
Patient Identification and Demographics – identify the patient and give a brief overview of patient demographics		
Chief Complaint and History of Present Illness – state and explain why did the patient seek medical attention in a logical fashion		
Past Medical History – list past medical history completely and accurately		
Prior to Admission Medications – list all prior to admission medications according to PMH		
Social and Family History – state patient's pertinent family or social history		
Review of Systems – state pertinent positive and negative findings		
Laboratory Findings – state pertinent positive and negative findings		
Course of Events – succinctly state the course of events during the current admission, e.g. admission to ward/service, medications initiation/continuation/changes		
Identify patient's disease state and the associated medication(s)		
Assess disease state to identify drug-related problem(s)/medication error(s) (if any)		
Provide recommendation(s)/intervention (s) for the disease state (if any)		
Provide monitoring plan and therapeutic goal(s) for the disease state		
Summarize the patient, recommendations/interventions and therapeutic plans		
Complete presentation within 10 min		
Display professionalism – attitude and communication style		

[a] √: tick, P: partial, X: cross.

individually recorded his or her ten-minute patient presentation and uploaded the audio file (in MP3 or M4A format) to the university's learning management system (LMS). During the in-class patient presentation workshop, each group used 3 to 5 minutes to verbally present the therapeutic plan for one to two disease states for their assigned patient. Subsequently, a faculty member clarified misconceptions and provided feedback on presentation structure, style, and therapeutic content. The workshop was conducted four times within one week to allow all groups the opportunity to present and each student attended only the workshop where his or her group was scheduled to present. Following the in-class workshop, each student was given one week to assess a peer's presentation that was audio-recorded and uploaded onto the university's LMS as part of the pre-class learning activities. This peer assessment activity was conducted in an anonymous manner using a grading rubric (see Table 2). The students' version of the rubric included an answer key to the patient case and specific evaluation criteria. A tick was to be awarded for accurately listing the patient's past medical history (PMH), a partial ("P") was to be awarded for a PMH that was incomplete (i.e. missing at least one disease state), and a cross ("X") would be given if the student stated a disease state that the patient did not have. A similar evaluation approach would be applied to other evaluation criteria in the rubric. Students were required to provide qualitative comments for all evaluation criteria where "P" or "X" grades were assigned. As formative feedback, students received grades and qualitative written comments given by their peers prior to session three, but the grades were not factored into students' overall module grade. Nonetheless, in order to encourage participation, students who completed the peer assessment activity received one mark as participation credit in the module.

Session three utilized the usual approach of conducting practical sessions in the module. Students were assigned a new patient case and allowed 45 minutes to prepare their patient presentations in class, and subsequently each student presented in-person to a TA. Grades assigned by TAs were factored into the students' overall grades for module. All TAs were first-year postgraduate students in the Doctor of Pharmacy program. These were registered pharmacists with at least three years of direct patient care experiences in acute-care or ambulatory care settings who were pursuing additional postgraduate clinical education. In preparation for teaching, TAs reviewed the patient presentation lecture delivered to the students (i.e. session one) and the faculty in-charge discussed patient cases used during the practical sessions along with therapeutic plans and the grading rubric which were identical in format and evaluation criteria as the rubric used for peer assessment in session two. Each TA was assigned three students per two-hour practical session and debriefed the group at the end. For a class of 191 students in PPSD III in academic year 2017–2018, session three involved 12 TAs who contributed 128 teaching hours in total over two weeks.

This was a cross-sectional study using an anonymous self-administered survey. A convenience sample of 191 third-year undergraduate pharmacy students in PPSD III in academic year 2017–2018 was included. All students completed three sessions for patient presentation skills within the module. This study was approved by the university's Institutional Review Board (approval number: S-18-059E).

The survey instrument (see Appendix 1) consisted of 29 items in four sections: (i) baseline knowledge, (ii) perceived importance of patient presentation, (iii) perceptions of peer assessment, and (iv) perceptions of feedback from TAs. Statements in the survey were derived from a previous study and adapted to reflect teaching activities in PPSD III.[10] Responses were measured using five-point Likert scale statements (ranging from "strongly agree" to "strongly disagree"), one yes/no question, and an open-ended question to allow for qualitative comments on peer assessment.

The survey was administered two weeks following completion of session three and after the completion of the last graded practical session in the module. Printed copies of the survey instrument were distributed in class and a collection box was placed at the exit for students to return their surveys. The rationale for the study was explained before the survey instruments were distributed.

Table 3
Students' attitudes and perceptions of peer assessment in learning patient presentation skills (n = 187).

Statements	Agreement n (%)[a]	Neutral n(%)	Disagreement n (%)[b]
I believe peer assessment is a useful skill in my career as a pharmacist.	165 (88)	21 (11)	1 (1)
I believe peer assessment is a useful way to obtain feedback on my patient presentation.[c]	161 (87)	16 (9)	9 (5)
I am comfortable providing an honest assessment of my classmate's patient presentation.	177 (95)	7 (4)	3 (2)
I am comfortable receiving an assessment of my patient presentation from a classmate.	177 (95)	9 (5)	1 (1)
I believe I have the necessary skills to assess my classmate's patient presentation.	122 (65)	50 (27)	15 (8)
I believe my classmate has the necessary skills to assess my patient presentation.	143 (76)	40 (21)	4 (2)
I believe a classmate will provide an honest assessment of my patient presentation.	169 (90)	16 (9)	2 (1)
In this module, I received constructive comments from my classmate on my patient presentation.	153 (82)	23 (12)	11 (6)
My classmate's comments helped me improve my patient presentation skills.	135 (72)	43 (23)	9 (5)

[a] Agreement = strongly agree + agree.
[b] Disagreement = strongly disagree + disagree,
[c] One missing response; analyzed n = 186.

Students were informed that participation was voluntary and anonymous and returning the survey served as their implicit consent to participate. Permission was sought from the faculty-in-charge for the last practical session prior to conducting the survey.

Responses were transcribed to Microsoft Excel® for analysis. Data from incomplete surveys were retained for analysis if at least 80% of questions were answered. Qualitative comments were reviewed to identify major themes, subthemes and representative quotes. Descriptive statistics were used to summarize quantitative results. Students' responses to five-point Likert scale statements were dichotomized to “agree” (i.e. strongly agree and agree) versus “did not agree” (i.e. neutral, disagree, and strongly disagree). McNemar's test was used to compare differences in students' perceptions on whether they agreed or did not agree with statements in the survey. An *a priori* alpha of <0.05 was used for statistical significance. Statistical analysis was performed using STATA® version 14.0.[12]

Findings

A total of 187 third-year undergraduate pharmacy students in PPSD III during the 2017–2018 academic year returned the survey. All surveys were retained for analysis (response rate: 98%). Most students reported no prior exposure to patient presentation skills (83%). Patient presentation skills were valuable additions to the module with most students recognizing the importance of such skills (99%) and acknowledging that it enhanced their ability to communicate patient-specific information (95%).

Students' attitudes and perceptions of peer assessment as a pedagogical strategy in learning patient presentation skills are summarized in Table 3. Students valued peer assessment as a useful way to obtain feedback on their patient presentations (87%) and believed that they received constructive feedback from peers (82%) that helped them improve their patient presentation skills (72%). Although most students believed that their peers would provide honest feedback, they were less likely to believe in their peers' skills in assessing patient presentations (90% versus 76%, $p < 0.001$). However, students were still more confident in their peer's skills than in their own skills in assessing patient presentations (76% versus 65%, $p < 0.001$).

Qualitative feedback is summarized in Table 4. Overall, peer assessment was useful to students by allowing their areas of improvement to be identified, facilitating learning from the strengths and mistakes of their peers and encouraging self-reflection as students realized their own mistakes when assessing their peers' work. However, some students were concerned that their peers might not have been critical enough of their work and comments were lacking adequate specificity.

Students' perceptions on factors that were or would have been helpful for receiving or providing feedback via peer assessment are shown in Table 5. Discussing patient cases in class with faculty beforehand and anonymity were perceived to be most helpful, with 90% and 88% of students respectively reporting that these were either very helpful or helpful factors. Instructions from faculty (83%) and reviewing examples (82%) were also perceived to be very helpful or helpful factors, while few students believed in the helpfulness of readings (32%).

Most students believed that TAs had the necessary skills to assess their patient presentation skills (93%) and would provide an honest assessment (97%). Students also had positive interactions with the TAs with most reporting that they received constructive comments (96%) that helped improve their patient presentation skills (95%). Table 6 presents students' attitudes and perceptions of receiving feedback via peer assessment relative to feedback from TAs. As compared to peer assessment, students were more likely to believe in TAs' skills (76% versus 93%, $p < 0.001$) and to perceive that they received comments from TAs that helped them improve their patient presentations (72% versus 95%, $p < 0.001$).

Nonetheless, the majority of students (86%) agreed that session two consisting of in-class discussion with faculty and receiving individual feedback via peer assessment was as useful as session three consisting of one-on-one sessions with TAs. However, few students (29%) agreed that patient presentation grades from peer assessment should be factored into their overall grade for the module.

Table 4
Summary of themes, subthemes and representative quotes on students' attitudes and perceptions of peer assessment.

Themes	Subthemes	Representative quotes
Usefulness of peer assessment	Identified mistakes	"He/she pointed out things that I missed and gave some comments on the structure of my presentation which helped me a lot" "My peer clearly pointed out the points I missed and was able to give constructive feedback to help improve my presentation" "Clearly pointed out the mistakes and provided some appropriate comments on how to rectify the errors"
	Identified strengths	"My peer gave words of encouragement (e.g., mentioning non-pharmacologic therapy)" "My peer also pointed out good things that I mentioned, even though it was not directly in the rubric, that was very encouraging to see"
	Encouraged self-reflection	"Assessing my peer's presentation provided me fresh insights on what he/she was doing well or aspects that he/she could improve on, I can take these into account when I am doing future presentations" "I realized that I missed out on quite a lot of information for my own patient presentation while I was going through my peer's presentation"
Quality of feedback provided in peer assessment	Specific and constructive	"The comments were specific and let me know exactly what I missed out" "Stated specific areas of improvement" "Provided constructive feedback on the components I may have overlooked and suggested specific areas which I can improve on"
	Inadequate comments	"No incentive for peers to go the extra mile when grading each other's work, the person assessing my presentation did not give much comments aside from the what's in the rubric" "Not specific enough on what I might be lacking in" "Feedback from peers were helpful but not enough"
	Less critical of mistakes made	"I think people were too nice with their comments" "My peer was not harsh enough, not as strict as a professor or my future preceptor would be"

Table 5
Students' perceptions on helpfulness for providing or receiving feedback via peer assessment (n = 187).

Factors	Very helpful n (%)	Helpful n (%)	Undecided n(%)	Somewhat helpful n (%)	Not helpful n (%)
Reading articles on how to conduct peer assessments	12 (6)	48 (26)	64 (34)	32 (17)	31 (17)
Receiving instructions from faculty on how to conduct peer assessments	53 (28)	99 (53)	18 (10)	16 (9)	1 (1)
Reviewing examples of peer assessments from similar assignments	56 (30)	98 (52)	20 (11)	11 (6)	2 (1)
Discussing patient cases in class beforehand with faculty	66 (35)	102 (55)	13 (7)	5 (3)	1 (1)
Making the peer assessment anonymous	77 (41)	88 (47)	14 (8)	6 (3)	2 (1)
Being friends with my classmates[a]	32 (17)	74 (40)	51 (27)	8 (4)	19 (10)

[a] Three missing response; analyzed n = 184.

Table 6
Students' attitudes and perceptions of receiving feedback via peer assessment relative to receiving feedback from TAs.

Statements	Peer assessment n (%)	TAs n (%)	p value
I am comfortable receiving feedback from the assessor.[a]	176 (95)	181 (97)	<0.001
I believe the assessor has the necessary skills to evaluate my patient presentation.	143 (76)	174 (93)	<0.001
I believe that the assessor will provide an honest assessment of my patient presentation.[b]	167 (90)	179 (97)	<0.001
In this module, I believe that I received constructive comments from the assessor.[b]	152 (82)	177 (96)	<0.001
The assessor's comments helped me improve my patient presentation skills.[a]	135 (73)	176 (95)	<0.001

TA = teaching assistant.
[a] One missing response; analyzed n = 186.
[b] Two missing response; analyzed n = 185.

Discussion

This study demonstrated the utility of peer assessment as a pedagogical strategy to provide formative feedback for teaching patient presentation skills to pharmacy students. Qualitative comments from students supported the value of peer assessment previously described in the literature (e.g., higher order thinking, self-reflection, peer interaction) remained relevant when peer assessment was utilized in the context of teaching patient presentation skills.[5,6] Unlike other published studies, this study utilized peer assessment to teach patient presentation skills in the classroom setting with a large class size. Other previously published studies

either described peer assessment in the context of evaluating written assignments in the classroom or presentations during experiential learning.[9–11,13–15] Our approach of using peer assessment was practicable. Session two involving peer assessment 8 hours of teaching time and 16 of administrative time from two faculty members which was significantly reduced as compared to 128 hours of teaching time from 12 TAs in session three. This was also the first study that compared pharmacy students' perceptions of feedback via peer assessment relative to feedback provided by TAs.

In our study, pharmacy students were equally comfortable with providing (95%) and receiving (95%) an honest assessment of their patient presentations from peers and believed that peers would provide an honest assessment (90%). These findings were similar to results from a previous study where peer assessment was used to evaluate drug monographs. However, in that study, students were less comfortable providing an honest assessment of their peers' work than in our study (80% versus 95%).[10] We postulate that the difference could be related to anonymity. In the previous study, students assessed their peers' work within groups of two or three students, thereby making anonymity impractical to achieve.[10] On the other hand, our peer assessment was an anonymous process whereby a student was randomly assigned to assess a peer's patient presentation in a class of 191 students, thereby improving students' comfort level in providing an honest assessment.

Most students felt that discussing cases beforehand with faculty (90%) and anonymity (88%) helped them provide and receive feedback on patient presentation skills via peer assessment. We believed that faculty-led discussions familiarized students with therapeutic content and further clarified characteristics of effective patient presentations, thereby equipping students with greater confidence when assessing their peers. A previous study also demonstrated that students found faculty guidance helpful (93%) in the peer assessment of SOAP notes.[9] Our findings were also congruent with other studies in medical and pharmacy education where anonymity was proven to be helpful for conducting peer assessments.[10,15,16] However, concerns could persist even when the process was anonymous. In a study by Arnold and colleagues,[17] most medical students believed that anonymity was a facilitator of peer assessment of each other's professionalism, some reported concerns such as retaliation and the lack of accountability in the feedback provided. Such concerns highlighted the importance for faculty to maintain oversight of the peer assessment process. Although students could be blinded to the identity of peers that they were receiving feedback from and providing feedback to, faculty should be privy of such information to ensure student accountability in the process. In our study, anonymity was achieved through the use of unique codes to identify audio recording files. Each code was linked to a student's name and the list was maintained by the faculty in-charge.

While our students acknowledged the value of feedback that they received via peer assessment, some had concerns about the inadequate specificity in feedback and criticalness of assessments. Similar concerns had previously been reported in other studies.[7,13] The presence of these concerns and conflicting comments (specific versus not specific enough) suggested that students might benefit from additional training in order to improve the consistency and quality of feedback in peer assessment. Our study further suggested helpful ways to do so such as provision of instructions and examples.

Studies demonstrate conflicting results when comparing students' perceptions of their own skills in peer assessment relative to that of their peers. In some studies, peer-assessment grades were higher compared to faculty or self-assigned grades.[13,15] On the other hand, Wu and colleagues[10] found that students had similar confidence level in their own skills relative to that of their peers (95% versus 92%) and Storjohann and colleagues[9] found no significant difference between peer assessment versus faculty-assigned SOAP note scores. We hypothesize that conflicting results might be related to students' familiarity with the content being assessed and the amount of training they received. Wu and colleagues[10] utilized a standardized assessment form and Storjohann and colleagues[9] conducted workshops to train students in assessing their peers' SOAP notes. Our study also utilized a standardized grading rubric but unlike the previous study where students had similar confidence level in their peers' skills than in their own skills (92% vs. 95%),[10] our students were more confident in their peers' skills (76% vs. 65%) despite their knowledge that patient presentation skills had not been taught in the curriculum and most of their peers had no prior exposure to patient presentations. Greater confidence in their peers' skills might be explained by students' general tendency toward leniency with peers that remained even in an anonymous peer assessment process.[13]

Few students agreed that the grades awarded by peers should be factored into their overall module grade. This should be interpreted in the context of our students' perceptions of peer assessment feedback relative to feedback provided by TAs. TAs were frequently engaged to evaluate students' work in the PPSD modules and at many other universities.[18] Consequently, our students were used to and more comfortable receiving feedback from TAs. TAs in this module were registered pharmacists with practice experiences and were trained in assessing patient presentations. In contrast, while our students fulfilled experiential learning hours during their first three years of studies, this was largely accomplished via community service projects rather than formal experiential learning. Since our students were aware that they and their peers had limited experiences, we surmise that they would therefore be concerned about whether their peers' assessment truly represented expectations in practice and thereby explaining their reservations in accounting peer assessment grades into their overall module grade.

Limitations of this study include that all participants were from the same cohort. Despite our large class size and high response rate, there might be differences in perceptions with other cohorts of students. While our peer assessment was intended to be anonymous, we could not remove or quantify the chances that a student might recognize the voice of the peer he or she was randomly assigned to assess. While faculty and TAs comments did suggest an improvement in students' patient presentation skills from sessions two to three, students' grades were not analyzed in this study as quantitative measurements of students' performance. Peers provided written feedback to ensure anonymity but TAs delivered feedback verbally. While previous research suggested that individual feedback delivered verbally or written are effective in higher education,[19] we could not exclude the possibility that some students might prefer a specific mode of feedback delivery which could in turn influence their perceptions of the usefulness of feedback via peer assessment and from TAs. Additionally, we received limited qualitative comments and therefore, we were unable to thoroughly

understand the rationale for our students' attitudes and perceptions.

While our study was conducted in pharmacy students at one university, communicating patient information is important for all healthcare professionals and pedagogical strategies for teaching such skills are relevant for other pharmacy and healthcare educators around the world. In settings where students have earlier exposure to patient presentations through classroom or experiential learning, peer assessment may even be a more effective pedagogical strategy as students may be more competent in assessing patient presentations and more trusting of the input from their peers.

Future studies might explore the factors that influence students' comfort level with incorporating peer assessment grades into their module grades, compare peer-assigned patient presentation scores relative to those assigned by TAs or faculty, evaluate the impact of providing peer assessment training and apply peer assessment for other skills-based activities.

Conclusion

Peer assessment was a useful pedagogical strategy in providing formative feedback for teaching patient presentations skills and was perceived favorably by pharmacy students in the classroom setting. Both feedback from peers and from TAs were perceived to be useful but comments from TAs were viewed upon more favorably. Some students had concerns about the quality of feedback via peer assessment and the implications for their module grade. To ensure the optimal use of peer assessment for enhancing students' patient presentation skills, considerations should be given to adequate student training, faculty oversight and debriefing to ensure that common and significant mistakes were adequately addressed.

Declaration of competing interest

None.

Appendix 1. PR3137 undergraduate pharmacy student survey – pharmacy students' attitudes and perceptions toward peer assessment and its utility in enhancing patient presentation skills

SECTION I. Baseline Knowledge

This section assesses your baseline knowledge of patient presentation before PR3137. Please read each statement and tick the box (√) corresponding to your response.

Statement	Response		
	Yes	No	If yes, please briefly describe your experiences (e.g., attachment, shadowing)
1. I have had exposure to presenting patient cases before PR3137.			

SECTION II. Patient Presentation

This section assesses your perceptions of the patient presentation component in PR3137. Please read each statement and tick the box (√) corresponding to your response.

Statement	Response				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
2. I believe patient presentation skills are important to pre-registration training and to my future practice as a pharmacist.					
3. I believe patient presentation should remain as a component in PR3137 in future academic years.					
4. The patient presentation component enhanced my skills in developing patient-specific therapeutic plans.					
5. The patient presentation component enhanced my skills in communicating patient-specific therapeutic plans.					
6. I feel more confident to start pre-registration training after learning patient presentation skills.					

SECTION III. Peer Assessment

Part A – This part assesses your attitudes and perceptions toward peer assessment as a strategy for learning patient presentation skills. Please read each statement and tick the box (√) corresponding to your response.

Statement[a]	Response				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
7. I believe I have the necessary skills to assess my classmate's patient presentation.					
8. I believe my classmate has the necessary skills to assess my patient presentation.					
9. I am comfortable providing an honest assessment of my classmate's patient presentation.					
10. I am comfortable receiving an assessment of my patient presentation from a classmate.					
11. I believe a classmate will provide an honest assessment of my patient presentation.					
12. I believe peer assessment is a useful way to obtain feedback on my patient presentation.					
13. I believe peer assessment is a useful skill in my career as a pharmacist.					
14. I believe the marks I received from my classmate should be factored into my overall grade for the module.					
15. In this module, I received constructive comments from my classmate on my patient presentation.					
16. My classmate's comments helped me improve my patient presentation skills.					

[a] Statements adapted with modifications from Wu K, et al. Am J Pharm Edu 2012; 76(4): 1–4.

Part B – This part assesses your perceptions of factors that were/would have been helpful toward providing and/or receiving peer assessment. Please read each statement and tick the box (√) corresponding to your response.

Statement	Response				
	Very Helpful	Helpful	Undecided	Somewhat Helpful	Not Helpful
17. Reading articles on how to conduct peer assessments.					
18. Receiving instructions from faculty on how to conduct peer assessments.					
19. Reviewing examples of constructive peer assessments from similar assignments in the past.					
20. Discussing patient cases and presentations in class with faculty before assessing my classmate.					
21. Making the peer assessment process anonymous.					
22. Being friends with my classmates.					

SECTION IV. One-On-One Patient Presentations

This section assesses your perceptions toward one-on-one patient presentation sessions with teaching assistants (TAs). Please read each statement and tick the box (√) corresponding to your response.

Statement	Response				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
23. I believe a TA has the necessary skills to assess my patient presentation.					
24. I am comfortable receiving an assessment of my patient presentation from a TA.					
25. I believe a TA will provide an honest assessment of my patient presentation.					
26. I received constructive comments from the TA on my patient presentation.					
27. The TA's comments helped me improve my patient presentation skills.					
28. I believe in-class discussion with faculty followed by peer assessment is as useful as one-on-one sessions with TAs in enhancing my patient presentation skills.					

SECTION V. Additional Comments or Feedback

29. Please use the space below to provide additional comments (if any) to elaborate upon any of the question(s) in earlier sections and/or to provide additional feedback.

End of Survey; thank you for your participation!

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